

## SEQUENCE LISTING

<110> ARTEMIS PHARMACEUTICALS GmbH

5 <120> Recombinant Influenza Viruses with Bicistronic vRNAs Coding for Two Genes in Tandem Arrangement

<130> 000746ep/JH/ml

10 <140>  
<141>

<160> 24

15 <170> PatentIn Ver. 2.1

<210> 1  
<211> 12  
<212> RNA  
20 <213> Influenza A virus

<400> 1  
ccugcuuuug cu 12

25 <210> 2  
<211> 12  
<212> RNA  
<213> Influenza B virus

30 <400> 2  
nnygcuucug cu 12

<210> 3  
<211> 12  
35 <212> RNA  
<213> Influenza C virus

<400> 3  
ccugcuucug cu 12

40 <210> 4  
<211> 12  
<212> RNA  
<213> Artificial Sequence

45 <220>  
<223> Description of Artificial Sequence: Modified  
influenza A 3'-sequence (pHL1104 and pHL1920)

<400> 4  
 ccuguuucua cu 12

5  
 <210> 5  
 <211> 12  
 <212> RNA  
 <213> Artificial Sequence

10  
 <220>  
 <223> Description of Artificial Sequence: Modified  
 influenza A 3'-sequence (pHL1948)

15 <400> 5  
 ccugguucuc cu 12

20  
 <210> 6  
 <211> 13  
 <212> RNA  
 <213> Influenza A virus

25  
 <400> 6  
 aguagaaaca agg 13

30  
 <210> 7  
 <211> 13  
 <212> RNA  
 <213> Influenza B virus

35  
 <400> 7  
 aguagwaaca rnn 13

40  
 <210> 8  
 <211> 13  
 <212> RNA  
 <213> Influenza C virus

45  
 <400> 8  
 agcaguagca agr 13

50  
 <210> 9  
 <211> 13  
 <212> RNA  
 <213> Artificial Sequence

55

<220>  
 <223> Description of Artificial Sequence: Modified  
 influenza A 5'-sequence (pHL1920)

5 <400> 9  
 agaagaauca agg 13

10 <210> 10  
 <211> 21  
 <212> RNA  
 <213> Influenza A virus

15 <400> 10  
 aguagaaaca aggnnnuuuu u 21

20 <210> 11  
 <211> 21  
 <212> RNA  
 <213> Artificial Sequence

25 <220>  
 <223> Description of Artificial Sequence: Modified  
 influenza A 5'-sequence (pHL1920)

30 <400> 11  
 agaagaauca aggnnnuuuu u 21

35 <210> 12  
 <211> 21  
 <212> RNA  
 <213> Influenza B virus

40 <400> 12  
 aguagwaaca rnnnnnuuuu u 21

45 <210> 13  
 <211> 19  
 <212> RNA  
 <213> Artificial Sequence

50 <220>  
 <223> Description of Artificial Sequence: Modified  
 influenza C 5'-sequence

<400> 13  
 aguaguaaca agrguuuuu 19

<210> 14  
 <211> 15  
 <212> RNA  
 <213> Artificial Sequence  
 5  
 <220>  
 <223> Description of Artificial Sequence: Modified  
 influenza A 3'-sequence (pHL1104 and pHL1920)  
 10 <400> 14  
 nnnccuguuu cuacu 15  
 <210> 15  
 15 <211> 15  
 <212> RNA  
 <213> Artificial Sequence  
 <220>  
 20 <223> Description of Artificial Sequence: Modified  
 influenza A 3'-sequence (pHL1948)  
 <400> 15  
 25 nnnccugguu cuccu 15  
 <210> 16  
 <211> 15  
 <212> RNA  
 30 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: Modified  
 influenza B 3' sequence  
 35 <400> 16  
 nnnnnyguuu cuacu 15  
 <210> 17  
 40 <211> 14  
 <212> RNA  
 <213> Artificial Sequence  
 45 <220>  
 <223> Description of Artificial Sequence: Modified  
 influenza C 3'-sequence  
 <400> 17  
 50 ccccuguuuc uacu 14

<210> 18  
 <211> 10  
 <212> DNA  
 <213> Influenza A virus

5

<400> 18  
 aggtacgttc

10

10 <210> 19  
 <211> 32  
 <212> DNA  
 <213> Influenza A virus

15 <400> 19  
 gctgaaaaat gatcttcttg aaaattgcag gc

32

20 <210> 20  
 <211> 3888  
 <212> DNA  
 <213> Artificial Sequence

25 <220>  
 <223> Description of Artificial Sequence: pHL1920

<400> 20  
 cccaaaaaaa aaaaaaaaaa aaaaaaaaaag agtccagagt ggccccgcgcg ttccgcgcgcg 60  
 gggggggggggg gggggggggga cactttcgga catctggtcg acctccagca tcgggggaaa 120  
 aaaaaaaaaaac aaagtttcgc ccggagtact ggctcgacctc cgaagttggg ggggagtaga 180  
 aacagggtag ataatcactc actgagtgc atccacatcg cgagcgcgcg taatacgact 240  
 cactataggg cgaattgggt accgggcccc ccctcgaggt cgacggtatc gataagcttc 300  
 gacgagattt tcaggagcta aggaagctaa aatggagaaa aaaatcactg gatataccac 360  
 cgttgatata tccaatggc atcgtaaaga acattttgag gcatttcagt cagttgctca 420  
 atgtacctat aaccagaccg ttcagctgga tattacggcc tttttaaaga ccgtaaagaa 480  
 aaataagcac aagttttatc cggcctttat tcacattctt gccgcctga tgaatgctca 540  
 tccggaattc cgtatggcaa tgaaagacgg tgagctggtg atatgggata gtgttcaccc 600  
 ttgttacacc gttttccatg agcaaaactga aacgttttca tcgctctgga gtgaatacca 660  
 cgacgatttc cggcagtttc tacacatata ttcgcaagat gtggcgtgtt acggtgaaaa 720  
 cctggcctat ttccctaaag ggttttattga gaatatgttt ttogtctcag ccaatccctg 780  
 ggtgagtttc accagttttg atttaaactg ggccaatatg gacaacttct tcgcccccg 840  
 tttcaccatg ggcaaatatt atacgcaagg cgacaagggt ctgatgccgc tggcgattca 900  
 ggttcacat gcggtttgtg atggcttcca tgcggcaga atgcttaatg aattacaaca 960  
 gtactgcgat gagtggcagg gcggggcgta atttttttaa ggcagttatt ggtgccctta 1020  
 aacgcctggt gctacgcctg aataagtgat aataagcgga tgaatggcag aaattcgctc 1080  
 aagcttgata tcgaattcct gcagcccggg ggatccacta gttctagagc ggccgccacc 1140  
 gcggtggagc tccagctttt gtcccttta gtgagggtta attgcgcgca ggcctagcta 1200  
 ggtaaagaaa aatacccttg attcttctaa taaccgcgcg gcccaaatg ccgactcgga 1260  
 gcgaaagata tacctcccc ggggccggga ggtcggtca ccgaccacgc gcccgccca 1320  
 ggcgacgcgc gacacggaca cctgtcccca aaaacgccac catcgagcc acacacggag 1380  
 cgcccggggc cctctggtca accccaggac acacgcggga gcagcgccgg gccggggacg 1440  
 ccctcccggc cgcccggtgc acacgcaggg ggccggcccg tgtctccaga gcgggagccg 1500  
 gaagcatttt cggccggccc ctctacgac cgggacacac gagggaccga aggccggcca 1560

5 ggcgcgacct ctggggccgc acgcgcgctc agggagcgct ctccgactcc gcacgggggac 1620  
 tcgccagaaa ggatcggtgac ctgcattaat gaatcagggg ataacgcagg aaagaacatg 1680  
 tgagcaaaaag gccagcaaaa ggccaggaac cgtaaaaagg ccgcgttgct ggcggtttttc 1740  
 cataggctcc gccccctga cgagcatcac aaaaatcgac gctcaagtca gaggtggcga 1800  
 aacccgacag gactataaag ataccaggcg tttccccctg gaagctccct cgtgcgctct 1860  
 cctgttccga ccctgccgct taccggatac ctgtccgcct ttctcccttc gggagcgctg 1920  
 gcgctttctc atagctcacg ctgtaggtat ctgagttcgg tgtaggctcg tcgctccaag 1980  
 ctgggctgtg tgcacgaacc ccccgttcag cccgaccgct gcgccttate cggttaactat 2040  
 10 cgtcttgagt ccaacccggg aagacacgac ttatcgccac tggcagcagc cactggtaac 2100  
 aggattagca gagcgaggta tgtaggcggt gctacagagt tcttgaagtg gtggcctaac 2160  
 tacggctaca ctagaaggac agtatttggg atctgcgctc tgctgaagcc agttaccttc 2220  
 ggaaaaagag ttggtagctc ttgatccggc aaacaaacca ccgctggtag cgggtggtttt 2280  
 tttgtttgca agcagcagat tacgcgcaga aaaaaaggat ctcaagaaga tcctttgatc 2340  
 ttttctacgg ggtctgacgc tcagtggaaac gaaaactcac gttaagggat tttgggtcatg 2400  
 15 agattatcaa aaaggatctt cacctagatc cttttaaatt aaaaatgaag ttttaaataca 2460  
 atctaaagta tatatgagta aacttgggtct gacagttacc aatgcttaat cagtgaggca 2520  
 cctatctcag cgatctgtct atttcgttca tccatagttg cctgactccc cgtcgtgtag 2580  
 ataactacga tacgggaggg cttaccatct ggcccagtg ctgcaatgat accgcgagac 2640  
 ccacgctcac cggctccaga tttatcagca ataaaccagc cagccggaag ggccgagcgc 2700  
 20 agaagtggtc ctgcaacttt atccgcctcc atccagtcta ttaattgttg ccgggaagct 2760  
 agagtaagta gttcgccagt taatagtttg cgcaacgttg ttgccattgc tacaggcatc 2820  
 gtggtgtcac gctcgtcgtt tgggtatggc tcattcagct ccggttccca acgatcaagg 2880  
 cgagttacat gatcccccat gttgtgcaaa aaagcgggta gtccttcgg tctccgatc 2940  
 gttgtcagaa gtaagttggc cgcagtgtta tcaactcatg ttatggcagc actgcataat 3000  
 25 tctcttactg tcatgccatc cgtaagatgc ttttctgtga ctggtgagta ctcaaccaag 3060  
 tcattctgag aatagtgtat gcggcgaccg agttgctctt gcccggcgtc aacacgggat 3120  
 aataccgcgc cacatagcag aactttaaaa gtgctcatca ttggaaaacg ttcttcgggg 3180  
 cgaaaactct caaggatctt accgctgttg agatccagtt cgatgtaacc cactcgtgca 3240  
 cccaactgat cttcagcatc ttttactttc accagcgttt ctgggtgagc aaaaacagga 3300  
 30 aggcaaaatg ccgcaaaaaa gggaataagg gcgacacgga aatggtgaat actcatactc 3360  
 ttcctttttc aatattattg aagcatttat caggggtatt gtctcatgag cggatacata 3420  
 tttgaatgta tttagaaaaa taaacaaaag agtttgtaga aacgcaaaaa ggccatccgt 3480  
 caggatggcc ttctgcttaa tttgatgcct ggcagtttat ggcgggcgtc ctgcccgcga 3540  
 ccctccgggc cgttgcttcg caacgttcaa atccgctccc ggcggatttg tctactcag 3600  
 35 gagagcggtc accgacaaac aacagataaa acgaaaggcc cagtctttcg actgagcctt 3660  
 tcgtttttatt tgatgcctgg cagttcccta ctctcgcatg gggagacccc acactaccat 3720  
 cggcgctacg gcgtttcact tctgagttcg gcatggggtc aggtgggacc accgcgctac 3780  
 tgccgcagag caaattctgt tttatcagac cgcttctgcg ttctgattta atctgtatca 3840  
 ggctgaaaaat cttctctcat ccgcaaaaac agaagctagc ggccgatc 3888  
 40

<210> 21

<211> 4500

<212> DNA

45 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: pHL3196

50 <400> 21

agtagaaaca gggtagataa tcaactactg agtgacatcc acatcgcgag cgccaaggta 60  
 cgttctcgag cgcgcgtaat acgactcact atagggcgaa ttgggtacgt tccatcatgg 120  
 agaaaaaaat cactggatat accaccgttg atatatccca atggcatcgt aaagaacatt 180

	ttgaggcatt	tcagtcagtt	gctcaatgta	cctataacca	gaccggttcag	ctggatatta	240
	cggccttttt	aaagaccgta	aagaaaaata	agcacaagtt	ttatccggcc	tttattcaca	300
	ttcttgcccg	cctgatgaat	gctcatccgg	aattccgtat	ggcaatgaaa	gacggtgagc	360
5	tggtgatatg	ggatagtgtt	cacccttggt	acaccgtttt	ccatgagcaa	actgaaacgt	420
	tttcatcgct	ctggagtga	taccacgacg	atttccggca	gtttctacac	atatattcgc	480
	aagatgtggc	gtgttacggg	gaaaacctgg	cctattttccc	taaaggggtt	attgagaata	540
	tgtttttcgt	ctcagccaat	ccctgggtga	gtttcaccag	ttttgattta	aacgtggcca	600
	atatggacaa	cttcttcgcc	cccgttttca	ccatgggcaa	atattatacg	caaggcgaca	660
	aggtgctgat	gccgctggcg	attcaggttc	atcatgcogt	ctgtgatggc	ttccatgtcg	720
10	gcagaatgct	taatgaatta	caacagtact	gcgatgagtg	gcagggcggg	gcgcgttaac	780
	gagatcagct	gaaaaatgat	cttcttgaaa	atttgcaggc	cgtacgtgta	ccgggcccc	840
	cctcgactcg	cgaaggagtc	caccatgagt	aaaggagaag	aactttttcac	tggagttgtc	900
	ccaattcttg	ttgaattaga	tggtgatgtt	aatgggcaca	aattttctgt	cagtggagag	960
	ggtgaagggtg	atgcaacata	cggaaaactt	acccttaa	ttattttgcac	tactggaaaa	1020
15	ctacctgttc	catggccaac	acttgtcact	actttcactt	atgggtgttca	atgcttttca	1080
	agatacccag	atcatatgaa	acagcatgac	tttttcaaga	gtgccatgcc	cgaaggttat	1140
	gtacaggaaa	gaactatatt	tttcaaagat	gacgggaact	acaagacacg	tgctgaagtc	1200
	aagtttgaag	gtgataccct	tggttaataga	atcgagttaa	aaggtattga	ttttaaagaa	1260
	gatggaaaca	ttcttgga	caaattggaa	tacaactata	actcacacaa	tgtatacatc	1320
20	atggctgaca	agcagaagaa	cggaatcaag	gccaaacttca	agaccgcga	caacatcgag	1380
	gacggcgccg	tgcagctggc	cgaccactac	cagcagaaca	ccccaatgg	cgatggccct	1440
	gtcctttttac	cagacaacca	ttaqctgtcc	acacaatctg	ccctttcgaa	agatcccaac	1500
	gaaaagagag	accacatggg	ccttcttgag	tttgtaacag	ctgctgggat	tacacatggc	1560
	atggatgaac	tatacaaggg	atcccatcac	catcaccatc	actaägetcc	atgggtctaga	1620
25	tatcgatagg	cctagctagg	taaagaaaaa	tacccttggt	tctactaata	accggcgccg	1680
	ccaaaatgcc	gactcggagc	gaaagatata	cctcccccg	ggccgggagg	tcgcgtcacc	1740
	gaccacgccg	ccggcccagg	cgacgcgcga	cacggacacc	tgtccccaaa	aacgccacca	1800
	tcgcagccac	acacggagcg	cccggggccc	tctggtcaac	cccaggacac	acgcgggagc	1860
	agcgcggggc	cggggacgcc	ctcccggccg	cccgtgccac	acgcaggggg	ccggcccgtg	1920
30	tctccagagc	gggagccgga	agcattttcg	gccggcccct	cctacgaccg	ggacacacga	1980
	gggaccgaag	gccggccagg	cgcgacctct	cgggcccgcac	gcgcgctcag	ggagcgctct	2040
	ccgactccgc	acggggactc	gccagaaagg	atcgtgacct	gcattaatga	atcaggggat	2100
	aacgcaggaa	agaacatgtg	agcaaaaggc	cagcaaaagg	ccaggaaccg	taaaaaggcc	2160
	gcgttgctgg	cgtttttcca	taggtctcgc	ccccctgacg	agcatcacia	aaatcgacgc	2220
35	tcaagtcaga	ggtggcgaaa	cccagacagga	ctataaagat	accaggcggt	tccccctgga	2280
	agctccctcg	tgcgtctctc	tgttccgacc	ctgccgctta	ccggatacct	gtccgccttt	2340
	ctcccttcgg	gaagcgtggc	gctttctcat	agctcacgct	gtaggtatct	cagttcgggtg	2400
	taggtcggtt	gctccaagct	gggctgtgtg	cacgaacccc	ccgttcagcc	cgaccgctgc	2460
	gccttatccg	gtaactatcg	tcttgagtcc	aaccgcgtaa	gacacgactt	atcgccactg	2520
40	gcagcagcca	ctggtaacag	gattagcaga	gcgaggtatg	taggcgggtg	tacagagttc	2580
	ttgaagtggg	ggcctaacta	cggctacact	agaaggacag	tatttggtat	ctgcgctctg	2640
	ctgaagccag	ttaccttcgg	aaaaagagtt	ggtagctctt	gatccggcaa	acaaaccacc	2700
	gctggtagcg	gtgggttttt	tggttgcaag	cagcagatta	cgcgcagaaa	aaaaggatct	2760
	caagaagatc	ctttgatctt	ttctacgggg	tctgacgctc	agtggaaacga	aaactcacgt	2820
45	taagggattt	tggtcatgag	attatcaaaa	aggatcttca	cctagatcct	tttaaattaa	2880
	aaatgaagtt	ttaaatcaat	ctaaagtata	tatgagtaaa	cttggctctga	cagttaccaa	2940
	tgcttaatca	gtgaggcacc	tatctcagcg	atctgtctat	ttcgttcac	catagttgcc	3000
	tgactccccg	tcgtgtagat	aactacgata	cgggagggct	taccatctgg	ccccagtgtc	3060
	gcaatgatac	cgcgagaccc	acgctcaccg	gctccagatt	tatcagcaat	aaaccagcca	3120
50	gccggaagg	ccgagcgcag	aagtggctct	gcaactttat	ccgcctccat	ccagtctatt	3180
	aattgttgcc	gggaagctag	agtaagtagt	tcgccagtta	atagtttgcg	caacgttggt	3240
	gccattgcta	caggcatcgt	ggtgtcacgc	tcgtcgtttg	gtatggcttc	attcagctcc	3300
	ggttcccaac	gatcaaggcg	agttacatga	tcccccatgt	tgtgcaaaaa	agcgggttagc	3360

```

5  tccttcgggc ctccgatcgt tgtcagaagt aagttggccg cagtgttatc actcatgggt 3420
   atggcagcac tgcataatcc tcttactgtc atgccatccg taagatgctt ttctgtgact 3480
   ggtgagtact caaccaagtc attctgagaa tagtgatgc ggcgaccgag ttgctcttgc 3540
   ccggcgctcaa cacgggataa taccgcgcca catagcagaa ctttaaaagt gctcatcatt 3600
   ggaaaaacgtt cttcggggcg aaaactctca aggatcttac cgctgttgag atccagttcg 3660
   atgtaaccca ctcgatgcacc caactgatct tcagcatctt ttactttcac cagcgtttct 3720
   ggggtgagcaa aaacaggaag gcaaaatgcc gcaaaaaagg gaataagggc gacacggaaa 3780
   tgttgaatac tcatactctt cctttttcaa tattattgaa gcatttatca gggttatcgt 3840
   ctcatgagcg gatacatatt tgaatgtatt tagaaaaata aacaaaagag tttgtagaaa 3900
10  cgcaaaaagg ccatccgtca ggatggcctt ctgcttaatt tgatgcctgg cagtttatgg 3960
   cgggcgtcct gcccgccacc ctccgggccc ttgcttcgca acgttcaa at ccgctcccgg 4020
   cggattttgtc ctactcagga gagcgttcac cgacaaacaa cagataaaac gaaaggccca 4080
   gtcttttcgac tgagcctttc gttttatttg atgcctggca gttccctact ctccgcatggg 4140
   gagacccccc actaccatcg gcgctacggc gtttcacttc tgagttcggc atgggggtcag 4200
15  gtgggaccac cgcgctactg ccgccaggca aattctgttt tatcagaccg cttctgcgtt 4260
   ctgattttaat ctgtatcagg ctgaaaaatct tctctcatcc gccaaaacag aagctagcgg 4320
   ccgatcccca aaaaaaaaaa aaaaaaaaaa aaaaagagtc cagagtggcc ccgccgttcc 4380
   gcgcgggggg gggggggggg ggggggacact ttcggacatc tggtcgacct ccagcatcgg 4440
   gggaaaaaaa aaaaacaaag tttcgcccg agtactggtc gacctccgaa gttggggggg 4500

```

20

&lt;210&gt; 22

&lt;211&gt; 4721

&lt;212&gt; DNA

25

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Description of Artificial Sequence: pHL3224

30

&lt;400&gt; 22

35

40

45

50

```

   atctagacca tggagcttag tgatggtgat ggtgatggga tccttgtat agttcatcca 60
   tgccatgtgt aatcccagca gctgttacaa actcaagaag gaccatgtgg tctctctttt 120
   cgttgggata tttcgaaagg gcagattgtg tggacaggta atggttgtct ggtaaaagga 180
   cagggccatc gccaatggg gtgttctgct ggtagtggtc ggccagctgc accgcccggt 240
   cctcgatggt gtggcgggtc ttgaagttag ccttgattcc gttcttctgc ttgtcagcca 300
   tgatgtatac attgtgtgag ttatagttgt attccaattt gtgtccaaga atgtttccat 360
   cttcttttaa atcaatacct tttaaactga ttctattaac aagggtatca ctttcaaact 420
   tgacttcagc acgtgtcttg tagttcccgt catctttgaa aaatatagtt ctttctctga 480
   cataaccttc gggcatggca ctcttgaaaa agtcatgctg tttcatatga tctgggtatc 540
   ttgaaaagca ttgaacacca taagtgaag tagtgacaag tgttggccat ggaacaggta 600
   gttttccagt agtgcaata aatttaaggg taagttttcc gtatgttgca tcaccttcac 660
   cctctccact gacagaaaat ttgtgcccat taacatcacc atctaattca acaagaattg 720
   ggacaactcc agtgaaaagt tcttctcctt tactcatggg ggactccttc gcgagtcgag 780
   gggggggccc gtacacgtac gcgctcgaga acgtaccttc gcgctcgaga tgtggatgtc 840
   actcagttag tgattatcta cctgtttct actcccccc aacttcggag gtcgaccagt 900
   actccgggag aaactttgtt tttttttttt ccccgatgc tggaggtcga ccagatgtcc 960
   gaaagtgtcc cccccccccc ccccccccg cgcggaacgg cggggccact ctggactctt 1020
   tttttttttt tttttttttt ttttggggat cggcgcgtag cttctgtttt ggcggatgag 1080
   agaagatttt cagcctgata cagattaaat cagaacgcag aagcggctctg ataaaacaga 1140
   atttgccctg cggcagtagc gcggtggtcc cacctgacct catgccgaac tcagaagtga 1200
   aacgcgtag cgccgatggg agtgtggggg ctccccatgc gagagtaggg aactgccagg 1260
   catcaaataa aacgaaaggc tcagtcgaaa gactgggcct ttcgttttat ctgttgtttg 1320
   tcggtgaacg ctctcctgag taggacaaat ccgcggggag cggatttgaa cgttgcgaa 1380

```

	caacggccccg	gaggggtggcg	ggcaggacgc	ccgccataaa	ctgccaggca	tcaaattaag	1440
	cagaaggcca	tccctgacgga	tggccttttt	gcgtttctac	aaactctttt	gtttattttt	1500
	ctaaatacat	tcaaatatgt	atccgctcat	gagacaataa	ccctgataaa	tgcttcaata	1560
	atattgaaaa	aggaagagta	tgagtattca	acatttccgt	gtcgccctta	ttcccttttt	1620
5	tgcggcattt	tgccttccctg	tttttgcctca	cccagaaacg	ctggtgaaag	taaaagatgc	1680
	tgaagatcag	ttgggtgcac	gagtgggtta	catcgaactg	gatctcaaca	gcggtaagat	1740
	ccttgagagt	tttcgccccg	aagaacgttt	tccaatgatg	agcactttta	aagttctgct	1800
	atgtggcgcg	gtattatccc	gtgttgacgc	cgggcaagag	caactcggtc	gccgcataca	1860
	ctattctcag	aatgacttgg	ttgagtactc	accagtcaca	gaaaagcatc	ttacggatgg	1920
10	catgacagta	agagaattat	gcagtgtctg	cataaccatg	agtataaca	ctcgggccaa	1980
	cttacttctg	acaacgatcg	gaggaccgaa	ggagctaacc	gcttttttgc	acaacatggg	2040
	ggatcatgta	actcgcttgc	atcgttggga	accggagctg	aatgaagcca	taccaaacga	2100
	cgagcgtgac	accacgatgc	ctgtagcaat	ggcaacaacg	ttgcgcaaac	tattaactgg	2160
	cgaactactt	actctagctt	cccggcaaca	attaatagac	tggatggagg	cggataaagt	2220
15	tgcaggacca	cttctgcgct	cggcccttcc	ggctggctgg	tttattgctg	ataaatctgg	2280
	agccggtgag	cgtgggtctc	gcggtatcat	tgcagcactg	gggccagatg	gtaagccctc	2340
	ccgtatcgta	gttatctaca	cgacggggag	tcaggcaact	atggatgaac	gaaatagaca	2400
	gatcgctgag	ataggtgcct	cactgattaa	gcatttgtaa	ctgtcagacc	aagtttactc	2460
	atatatactt	tagattgatt	taaaacttca	tttttaattt	aaaaggatct	aggtgaagat	2520
20	cctttttgat	aatctcatga	ccaaaatccc	ttaacgtgag	ttttcgcttc	actgagcgtc	2580
	agaccccgtg	gaaaagatca	aaggatcttc	ttgagatcct	ttttttctgc	gcgtaatctg	2640
	ctgcttgcaa	acaaaaaaac	caccgctacc	agcgggtggt	tgtttgccgg	atcaagagct	2700
	accaactctt	tttcggaagg	taactggctt	cagcagagcg	cagataccaa	atactgtcct	2760
	tctagtgtag	ccgtagttag	gccaccactt	caagaactct	gtagcaccgc	ctacatacct	2820
25	cgctctgcta	atcctgttac	cagtggctgc	tgccagtggc	gataagtcgt	gtcttaccgg	2880
	gttggaactca	agacgatagt	taccggataa	ggcgagcgcg	tcgggctgaa	cgggggggtc	2940
	gtgcacacag	cccagcttgg	agcgaacgac	ctacaccgaa	ctgagatacc	tacagcgtga	3000
	gctatgagaa	agcgccacgc	ttcccgaagg	gagaaaggcg	gacaggtatc	cggtaagcgg	3060
	cagggtcgga	acaggagagc	gcacgagggg	gcttccaggg	ggaaacgcct	ggtatcttta	3120
30	tagtcctgtc	gggtttcgcc	acctctgact	tgagcgctga	tttttgtgat	gctcgtcagg	3180
	ggggcgggagc	ctatggaaaa	acgccagcaa	cgcggccttt	ttacggttcc	tggccttttg	3240
	ctggcctttt	gtccacatgt	tctttcctgc	gttatccctt	gattcattaa	tgcaggtcac	3300
	gatcctttct	ggcgagtccc	cgtgcggagt	cggagagcgc	tccctgagcg	cgcgtgcggc	3360
	ccgagaggtc	gcgcctggcc	ggccttcggt	cctcgtgtg	tcccggctgt	aggagggggc	3420
35	ggccgaaaat	gcttccggct	cccgtctctg	agacacgggc	cggcccccctg	cgtgtggcac	3480
	gggcggccgg	gagggcgctc	cgggcccggc	gctgctcccg	cgtgtgtcct	ggggttgacc	3540
	agagggcccc	gggcgctccg	tgtgtggctg	cgatggtggc	gtttttgggg	acaggtgtcc	3600
	gtgtcgcgcg	tcgcctgggc	cggcggcgtg	gtcggtgacg	cgacctcccg	gccccggggg	3660
	aggtatatct	ttcgctccga	gtcggcattt	tgggccgcgc	ggttattagt	agaaacaagg	3720
40	gtatttttct	ttacctagct	aggcctgcgc	gcaattaacc	ctcactaaag	ggaacaaaag	3780
	ctggagctcc	accgcggtgg	cggccgctct	agaactagtg	gatcccccg	gctgcaggaa	3840
	ttcgatatca	agcttcgacg	aatttctgcc	attcatccgc	ttattatcac	ttattcaggc	3900
	gtagcaccag	gcgtttaagg	gcaccaataa	ctgccttaaa	aaaattacgc	cccgccttgc	3960
	cactcatcgc	agtactgttg	taattcatta	agcattctgc	cgacatggaa	gccatcacaa	4020
45	acggcatgat	gaacctgaat	cgccagcggc	atcagcacct	tgtcgcttgc	cgtataatat	4080
	ttgcccattg	tgaaaacggg	ggcgaagaag	ttgtccatat	tggccacgtt	taaatcaaaa	4140
	ctggtgaaac	tcacccaggg	attggctgag	acgaaaaaca	tattctcaat	aaacccttta	4200
	gggaaatagg	ccaggttttc	accgtaacac	gccacatctt	gcgaatatat	gtgtagaaac	4260
	tgccggaaat	cgtcgtggta	ttcactccag	agcgatgaaa	acgtttcagt	ttgctcatgg	4320
50	aaaacggtgt	aacaagggtg	aacactatcc	catatcacca	gctcaccgtc	tttcattgcc	4380
	atacgaattt	ccggatgagc	attcatcagg	cgggcaagaa	tgtgaataaa	ggccggataa	4440
	aacttgtgct	tatttttctt	tacggctctt	aaaaaggccg	taatattccg	ctgaacgggtc	4500
	tggttatagg	tacattgagc	aactgactga	aatgcctcaa	aatgttcttt	acgatgccat	4560

tgggatatat caacgggtggt atatccagtg atttttttct ccatttttagc ttccttagct 4620  
 cctgaaaatc tcgtcgaagc ttatcgatac cgtcgacctc gagggggggc ccggtacggc 4680  
 ctgcaaattt tcaagaagat catttttcag ctgatctcgt t 4721

5

&lt;210&gt; 23

&lt;211&gt; 5517

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

10

&lt;220&gt;

&lt;223&gt; Description of Artificial Sequence: pHL3235

&lt;400&gt; 23

15 agtagaaaaca gggtagataa tcactcactg agtgacatcc acatcgcgag cggaaggta 60  
 cggttctcgag cgcgcgtaat acgactcact atagggcgaa ttgggtacgt tccatcatgg 120  
 agaaaaaaat cactggatat accaccgttg atatatccca atggcatcgt aaagaacatt 180  
 ttgaggcatt tcagtcagtt gctcaatgta cctataacca gaccgttcag ctggatatta 240  
 20 cggccttttt aaagaccgta aagaaaaata agcacaagtt ttatccggcc ttatttcaca 300  
 ttcttgcccg cctgatgaat gctcatccgg aattccgtat ggcaatgaaa gacggtgagc 360  
 tgggtgatatg ggatagtgtt cacccttggt acaccgtttt ccatgagcaa actgaaacgt 420  
 tttcatcgct ctggagtga taccacgacg atttccggca gtttctacac atatattcgc 480  
 aagatgtggc gtgttacggt gaaaacctgg cctatttccc taaagggttt attgagaata 540  
 tgtttttcgt ctcagccaat ccctgggtga gtttccaccg ttttgattta aacgtggcca 600  
 25 atatggacaa cttcttcgcc ccctgtttca ccatgggcaa atattatacg caaggcgaca 660  
 aggtgctgat gccgctggcg attcagggtt atcatgccgt ctgtgatggc ttccatgtcg 720  
 gcagaatgct taatgaatta caacagtact gcgatgagtg gcagggcggg gcgcgttaac 780  
 gagatcagct gaaaaatgat cttcttgaaa atttgcaggc cgtacgtgta ccgggcccc 840  
 cctcgactcg cgaaggagtc caccatgagt aaaggagaag aacttttcac tggagttgtc 900  
 30 ccaattcttg ttgaattaga tgggtgatgtt aatgggcaca aattttctgt cagtggagag 960  
 ggtgaagggtg atgcaacata cggaaaactt acccttaa atttttgcac tactggaaaa 1020  
 ctacctgttc catggccaac acttgtcact actttcactt atgggtgttca atgcttttca 1080  
 agatacccag atcatatgaa acagcatgac tttttcaaga gtgccatgcc cgaagggttat 1140  
 gtacaggaaa gaactatatt tttcaaagat gacgggaact acaagacacg tgctgaagtc 1200  
 35 aagtttgaag gtgataccct tgttaataga atcgagttaa aagggtattga ttttaaagaa 1260  
 gatggaaaaca ttcttggaca caaattggaa tacaactata actcacacaa tgtatacatc 1320  
 atggctgaca agcagaagaa cggaatcaag gccaaacttca agaccgcca caacatcgag 1380  
 gacggcgggc tgcagctggc cgaccactac cagcagaaca cccaattgg cgatggccct 1440  
 gtccttttac cagacaacca ttacctgtcc acacaatctg ccctttcgaa agatcccaac 1500  
 40 gaaaagagag accacatggt ccttcttgag tttgtaacag ctgctgggat tacacatggc 1560  
 atggatgaac tatacaaggg atcttcatga tctcagcaaa ctcttccttc ttaatccttc 1620  
 cagactcgaa gtcaattcgt gcatcaatcc gggccctaga caccatggcc tccaccatac 1680  
 tggaaattcc aactgggtct ctgtatgagc tgctaggga gaatttctcg aatagggttg 1740  
 aacacttctg gtacatttgt tcactctcaa ggattccct ttgactcgta ttgagaatgg 1800  
 45 aacggtttct cttagggatc caagagtgtg tagttgccac agcatcatat tccatgcttt 1860  
 tggctggacc atgggctggc attaccgcag cattgtttac agattcaatt tccttatgac 1920  
 tgacaaacgg gttcatggga ttacaaagtc ttccctgata gtcttcatcc attagttccc 1980  
 atttcaggca aacttccggg atgtggagat tccgaatgtt gtacagggtt ggtccgcgat 2040  
 ctgaaaccaa cagtcctgcc tttgagcggg tctgctccca cagcttcttt agctcgaatg 2100  
 50 acctcctcgt ttggatttgt gtgtctccc tgtgacacc gtatgtatat ctgtagtcc 2160  
 tgatgaataa ttggagagcc atttgggctg ttgccggtcc aagatcattg tttatcatgt 2220  
 tattctttat cactgttact ccaatgctca tatcagccga ttcattaatt cctgatactc 2280  
 caaagctggg caactccata ctaaaattgg ctacaaatcc atagcggtag aaaaagcttg 2340

	tgaattcgaa	tgttctctgtc	ctattttatat	aggactttttt	cttgctcata	ttgatcccaa	2400
	ctagcttgca	ggttctgtag	aatctatcca	ctcccgttg	tattccctca	tgatttggtg	2460
	cattcacgat	gagagcaaaa	tcacagagg	actgaagtcc	atcccaccag	tatgtggttt	2520
	tggtgtatct	cttttgccca	agattcagga	ttgagactcc	caacactgta	ctcagcatgt	2580
5	tgaacatacc	catcatcatt	cccgggctta	atgaggctgt	gccgtctatt	atgagaggat	2640
	cgataggcct	agctaggtaa	agaaaaatac	ccttgtttct	actaataacc	cggcggccca	2700
	aaatgccgac	tcggagcgaa	agatatacct	cccccgggc	cgggaggtcg	cgtcacccgac	2760
	cacgccgcgc	gcccaggcga	cgcgcgacac	ggacacctgt	ccccaaaaac	gccaccatcg	2820
	cagccacaca	cggagcgccc	ggggccctct	ggtcaacccc	aggacacacg	cgggagcagc	2880
10	gccgggccc	ggacgcctc	cggccgccc	gtgccacacg	cagggggccg	gcccgtgtct	2940
	ccagagcggg	agccggaagc	attttcggcc	ggccctcct	acgaccggga	cacacgaggg	3000
	accgaaggcc	ggccaggcgc	gacctctcgg	gccgcacgcg	cgctcaggga	gcgctctccg	3060
	actccgcacg	gggactcgcc	agaaaggatc	gtgacctgca	ttaatgaatc	aggggataac	3120
	gcaggaaaga	acatgtgagc	aaaaggccag	caaaaggcca	ggaaccgtaa	aaaggccgcg	3180
15	ttgctggcgt	ttttccatag	gctccgccc	cctgacgagc	atcacaaaaa	tcgacgctca	3240
	agtcagaggt	ggcgaacccc	gacaggacta	taaagatacc	aggcgtttcc	ccctggaagc	3300
	tcctctgtgc	gctctcctgt	tcgacctg	ccgcttacgc	gatacctgtc	cgcctttctc	3360
	ccttcgggaa	gcgtggcgct	ttctcatagc	tcacgctgta	ggtatctcag	ttcgggtgtag	3420
	gtcgttcgct	ccaagctggg	ctgtgtgcac	gaaccccccg	ttcagcccga	ccgctgcgcc	3480
20	ttatccggtg	actatcgtct	tgagtccaac	ccggtgaagc	acgacttatc	gccactggca	3540
	gcagccactg	gtaacaggat	tagcagagcg	aggtagtag	gcggtgctac	agagtctctg	3600
	aagtgggtgg	ctaactacgg	ctacactaga	aggacagtat	ttggtatctg	cgctctgctg	3660
	aagccagtta	ccttcggaaa	aagagttggt	agctcttgat	ccggcaaaaa	aaccaccgct	3720
	ggtagcgggtg	gtttttttgt	ttgcaagcag	cagattacgc	gcagaaaaaa	aggatctcaa	3780
25	gaagatcctt	tgatcttttc	tacggggtct	gacgctcagt	ggaacgaaaa	ctcacgttaa	3840
	gggatttttg	tcacagagatt	atcaaaaagg	atcttcacct	agatcctttt	aaattaaanaa	3900
	tgaagtttta	aatcaatcta	aagtatatat	gagtaaaact	ggtctgacag	ttaccaatgc	3960
	ttaatcagtg	aggcacctat	ctcagcgatc	tgtctatttc	gttcatccat	agttgcctga	4020
	ctccccgtcg	tgtagataac	tacgatacgg	gagggttac	catctggccc	cagtgtctga	4080
30	atgataccgc	gagacccacg	ctcaccggct	ccagatttat	cagcaataaa	ccagccagcc	4140
	ggaagggccg	agcgcagaag	tggtcctgca	actttatccg	cctccatcca	gtctattaat	4200
	tggttgccggg	aagctagagt	aagtagttcg	ccagttaata	gtttgcgcaa	cgttgttgcc	4260
	attgctacag	gcacgtggt	gtcacgctcg	tcgtttggta	tggtcttcatt	cagctccggg	4320
	tcccaacgat	caaggcgagt	tacatgatcc	cccatgttgt	gcaaaaaagc	ggtagctcc	4380
35	ttcggtcctc	cgatcgttgt	cagaagtaag	ttggccgcag	tggttatcact	catggttatg	4440
	gcagcactgc	ataattctct	tactgtcatg	ccatccgtaa	gatgcttttc	tgtgactggt	4500
	gagtactcaa	ccaagtcatt	ctgagaatag	tgtatgcggc	gaccgagttg	ctcttgccc	4560
	gcgtcaacac	gggataatac	cgcgccacat	agcagaactt	taaaagtgtc	catcattgga	4620
	aaacgttctt	cggggcgaaa	actctcaagg	atcttaccgc	tggtgagatc	cagttcgatg	4680
40	taaccactc	gtgcacccaa	ctgatcttca	gcacctttta	ctttcaccag	cgtttctggg	4740
	tgagcaaaaa	caggaaggca	aaatgccgca	aaaaagggaa	taaggggcgac	acggaaatgt	4800
	tgaataactca	tactcttctc	ttttcaatat	tattgaagca	tttatcaggg	ttattgtctc	4860
	atgagcggat	acatatttga	atgtattttag	aaaaataaac	aaaagagttt	gtagaaacgc	4920
	aaaaaggcca	tcgctcagga	tggtccttctg	cttaatttga	tgcttgccag	tttatggcgg	4980
45	gcgtcctgcc	cgcaccctc	cgggcggttg	cttcgcaacg	ttcaaatccg	ctcccggcgg	5040
	atgtgtccta	ctcaggagag	cgttcaccga	caaacaacag	ataaaaacgaa	aggcccagtc	5100
	tttcgactga	gcctttcgtt	ttattttgatg	cctggcagtt	ccctactctc	gcattggggag	5160
	acccacact	accatcggcg	ctacggcggt	tcacttctga	gttcggcatg	gggtcagggtg	5220
	ggaccaccgc	gctactgccg	ccaggcgaat	tctgttttat	cagaccgctt	ctgcgttctg	5280
50	atttaatctg	tatcaggctg	aaaatcttct	ctcatccgcc	aaaacagaag	ctagcggccg	5340
	atccccaaaa	aaaaaaaaaa	aaaaaaaaaa	aagagtcag	agtggccccc	ccgttccgcg	5400
	ccggggggggg	ggggggggggg	ggacactttc	ggacatctgg	tcgacctcca	gcacgggggg	5460
	aaaaaaaaaaa	aacaaagttt	cggccggagt	actggtcgac	ctccgaagtt	gggggggg	5517

&lt;210&gt; 24

&lt;211&gt; 5699

5 &lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Description of Artificial Sequence: pHL3236

10

&lt;400&gt; 24

15

20

25

30

35

40

45

50

```

cctctcataa tagacggcac agcctcatta agcccgggaa tgatgatggg tatgttcaac 60
atgctgagta cagtgttggg agtctcaatc ctgaatcttg ggcaaaagag atacaccaa 120
accacatact ggtgggatgg acttcagtc tctgatgatt ttgctctcat cgtgaatgca 180
ccaaatcatg agggaataca agcgggagtg gatagattct acagaacctg caagctagtt 240
gggatcaata tgagcaagaa aaagtcctat ataaatagga caggaacatt cgaattcaca 300
agctttttct accgctatgg atttgtagcc aatttttagta tggagttgcc cagcttttga 360
gtatcaggaa ttaatgaatc ggctgatatg agcattggag taacagtgat aaagaataac 420
atgataaaca atgatcttgg accggcaaca gcccaaatgg ctctccaatt attcatcaag 480
gactacagat atacataccg gtgtcacagg ggagacacac aaatccaaac gaggaggtca 540
ttcgagctaa agaagctgtg ggagcagacc cgctcaaagg caggactgtt ggtttcagat 600
ggcggaccaaa acctgtacaa cattcggaat ctccacatcc cggaagtttg cctgaaatgg 660
gaactaatgg atgaagacta tcagggaaga ctttghtaat ccatgaaccc gtttgtcagt 720
cataaggaaa ttgaatctgt aaacaatgct gcggtaatgc cagcccatgg tccagccaaa 780
agcatggaat atgatgctgt ggcaactaca cactcttggg tccctaagag aaaccgttcc 840
attctcaata cgagtcaaag ggggaatcctt gaggatgaac aaatgtacca gaagtgttgc 900
aacctattcg agaaattctt ccctagcagc tcatacagaa gaccagttgg aatttccagt 960
atgggtggagg ccatggtgtc tagggcccgg attgatgcac gaattgactt cgagtctgga 1020
aggattaaga aggaagagtt tgctgagatc atgaagatcc cccgggctgc aggaattcga 1080
tatcaagctt cgacgaattt ctgccattca tccgcttatt atcacttatt caggcgtagc 1140
accaggcgtt taagggcacc aataactgcc ttaaaaaaat tacgccccgc cctgccactc 1200
atcgcagtac tgttghtaatt cattaagcat tctgccgaca tggaagccat cacaaacggc 1260
atgatgaacc tgaatcgcca gcggcacacg caccttgtcg ccttgcgtat aatatttggc 1320
catggtgaaa acggggggcg agaagttgtc catattggcc acgtttaaat caaaactggc 1380
gaaactcacc cagggatttg ctgagacgaa aaacatattc tcaataaacc ctttagggaa 1440
ataggccagg ttttcaccgt aacacgccac atcttgcgaa tatatgtgta gaaactgccg 1500
gaaatcgctg tggatttcac tccagagcga tgaaaacgtt tcagtttgct catggaaaac 1560
ggtgtaacaa ggggtgaacac tatcccatat caccagctca ccgtctttca ttgccatacg 1620
gaattccgga tgagcattca tcaggcgggc aagaatgtga ataaaggccg gataaaaactt 1680
gtgcttattt ttctttacgg tctttaaaaa ggccgtaata tccagctgaa cggctctggtt 1740
ataggtacat tgagcaactg actgaaatgc ctcaaatgt tctttacgat gccattggga 1800
tatatcaacg gtggtatatc cagtgatatt tttctccatt ttagcttccct tagctcctga 1860
aaatctcgtc gaagcttatc gataccgtcg acctcgaggg ggggcccggt acggcctgca 1920
aattttcaag aagatcattt ttcagctgat ctcgttatct agaccatgga gcttagtgat 1980
ggtgatggtg atgggatccc ttgtatagtt catccatgcc atgtgtaatc ccagcagctg 2040
ttacaaactc aagaaggacc atgtggtctc tcttttcggt gggatctttc gaaagggcag 2100
attgtgtgga caggtaatgg ttgtctggta aaaggacagg gccatcgcca attgggggtg 2160
tctgctggta gtggtcggcc agctgcacgc cgccgtctc gatgttgtgg cgggtcttga 2220
agttggcctt gattccgttc ttctgcttgt cagccatgat gtatacattg tgtgagttat 2280
agttgtattc caatttgtgt ccaagaatgt ttccatcttc tttaaaatca atacctttta 2340
actcgattct attaacaagg gtatcacctt caaacttgac ttcagcacgt gtctttagt 2400
tcccgctatc tttgaaaaat atagttcttt cctgtacata accttcgggc atggcactct 2460
tgaaaaagtc atgctgtttc atatgatctg ggtatcttga aaagcattga acaccataag 2520

```

	tgaaagtagt	gacaagtgtt	ggccatggaa	caggtagttt	tccagtagtg	caaataaatt	2580
	taagggttaag	ttttccgtat	gttgcacac	cttcaccctc	tccactgaca	gaaaatttgt	2640
	gcccatatac	atcaccatct	aattcaacaa	gaattgggac	aactccagtg	aaaagttctt	2700
	ctcctttact	catgggtggac	tccttcgcga	gtcagggggg	ggcccgggtac	acgtacgcgc	2760
5	tcgagaacgt	accttcgcgc	tcgcgatgtg	gatgtcactc	agtgagtgat	tatctaccct	2820
	gtttctactc	ccccccaact	tcggaggtcg	accagtactc	cgggcgaaac	tttgtttttt	2880
	ttttttcccc	cgatgctgga	ggtcgaccag	atgtccgaaa	gtgtccccc	ccccccccc	2940
	ccccggcgcg	gaacggcggg	gccactctgg	actctttttt	tttttttttt	tttttttttt	3000
	ggggatcggc	cgctagcttc	tgttttgggc	gatgagagaa	gattttcagc	ctgatacaga	3060
10	ttaaatacaga	acgcagaagc	ggtctgataa	aacagaattt	gcctggcggc	agtagcgcg	3120
	tgggtcccacc	tgaccccatg	ccgaactcag	aagtgaacg	ccgtagcgcc	gatggtagtg	3180
	tggggtctcc	ccatgcgaga	gtagggaact	gccaggcatc	aaataaaacg	aaaggctcag	3240
	tcgaaagact	gggcctttcg	ttttatctgt	tgtttgtcgg	tgaacgctct	cctgagtagg	3300
	acaaatccgc	cgggagcgga	tttgaacgtt	gcgaagcaac	ggcccggagg	gtggcgggca	3360
15	ggacgcccgc	cataaactgc	caggcatcaa	attaagcaga	aggccatcct	gacggatggc	3420
	ctttttgctg	ttctacaaac	tcttttggtt	atattttctaa	atacattcaa	atatgtatcc	3480
	gctcatgaga	caataaccct	gataaatgct	tcaataatat	tgaaaaagga	agagtatgag	3540
	tattcaacat	ttccgtgtcg	cccttattcc	cttttttgcg	gcattttgcc	ttcctgtttt	3600
	tgctcaccca	gaaacgctgg	tgaagtaaa	agatgctgaa	gatcagttgg	gtgcacgagt	3660
20	gggttacatc	gaactggatc	tcaacagcgg	taagatcctt	gagagttttc	gccccgaaga	3720
	acgttttcca	atgatgagca	cttttaaagt	tctgctatgt	ggcgcggtat	tatcccgtgt	3780
	tgacgcgggg	caagagcaac	tcggtcgccc	catacactat	tctcagaatg	acttggttga	3840
	gtactcacca	gtcacagaaa	agcatcttac	ggatggcatg	acagtaagag	aattatgcag	3900
	tgctgccata	accatgagtg	ataacactgc	ggccaactta	cttctgacaa	cgatcggagg	3960
25	accgaaggag	ctaaccgctt	ttttgcacaa	catgggggat	catgtaactc	gccttgatcg	4020
	ttgggaaccg	gagctgaatg	aagccatacc	aaacgacgag	cgtgacacca	cgatgcctgt	4080
	agcaatggca	acaacgttgc	gcaaactatt	aactggcgaa	ctacttactc	tagcttcccg	4140
	gcaacaatta	atagactgga	tggaggcgga	taaagttgca	ggaccacttc	tgcgctcggc	4200
	ccttcgggct	ggctggttta	ttgctgataa	atctggagcc	ggtgagcgtg	ggtctcgcgg	4260
30	tatcattgca	gcactggggc	cagatggtaa	gccctcccgt	atcgtagtta	tctacacgac	4320
	ggggagtcag	gcaactatgg	atgaacgaaa	tagacagatc	gctgagatag	gtgcctcact	4380
	gattaagcat	tggtaactgt	cagaccaagt	ttactcatat	atactttaga	ttgatttaaa	4440
	acttcatttt	taattttaaa	ggatctaggt	gaagatcctt	tttgataatc	tcatgaccaa	4500
	aatcccttaa	cgtgagtttt	cgttccactg	agcgtcagac	cccgtagaaa	agatcaaagg	4560
35	atcttcttga	gatccttttt	ttctgcgcgt	aatctgctgc	ttgcaaacaa	aaaaaccacc	4620
	gctaccagcg	gtggttttgt	tgccggatca	agagctacca	actctttttc	cgaaggtaac	4680
	tggcttcagc	agagcgcaga	taccaaatac	tgtccttcta	gtgtagccgt	agttaggcca	4740
	ccacttcaag	aactctgtag	caccgcctac	atacctcgct	ctgctaatac	tgttaccagt	4800
	ggctgctgcc	agtggcgata	agtcgtgtct	taccgggttg	gactcaagac	gatagttacc	4860
40	ggataaggcg	cagcggtcgg	gctgaacggg	gggttcgtgc	acacagccca	gcttgagcgc	4920
	aacgacctac	accgaactga	gatacctaca	gcgtgagcta	tgagaaagcg	ccacgcttcc	4980
	cgaagggaga	aaggcgga	ggtatccggt	aagcggcagg	gtcggaacag	gagagcgcac	5040
	gagggagctt	ccagggggaa	acgcctggta	tctttatagt	cctgtcgggt	ttcgccacct	5100
	ctgacttgag	cgtcgatttt	tgtgatgtct	gtcagggggg	cggagcctat	ggaaaaacgc	5160
45	cagcaacgcg	gcctttttac	ggttcctggc	cttttgctgg	ccttttgctc	acatgttctt	5220
	tcctgogtta	tcctctgatt	cattaatgca	ggtcacgata	ctttctggcg	agtccccgtg	5280
	cggagtcgga	gagcgtctcc	tgagcgcgcg	tgcggcccgga	gaggtcgcgc	ctggccggcc	5340
	ttcggtccct	cgtgtgtccc	ggtcgtagga	ggggccggcc	gaaaatgctt	ccggctcccg	5400
	ctctggagac	acgggcccgc	cccctgcgtg	tggcacgggc	ggccgggagg	gcgtccccgc	5460
50	cccggcgctg	ctcccgcgtg	tgtcctgggg	ttgaccagag	ggccccgggc	gctccgtgtg	5520
	tggctgcgat	ggtggcggtt	ttggggacag	gtgtccgtgt	cgcgcgtcgc	ctgggcccgc	5580
	ggcgtggctg	gtgacgcgac	ctcccggccc	cgggggaggt	atatctttcg	ctccgagtcg	5640
	gcattttggg	ccgccgggtt	attagtagaa	acaagggtat	ttttctttac	ctagctagg	5699